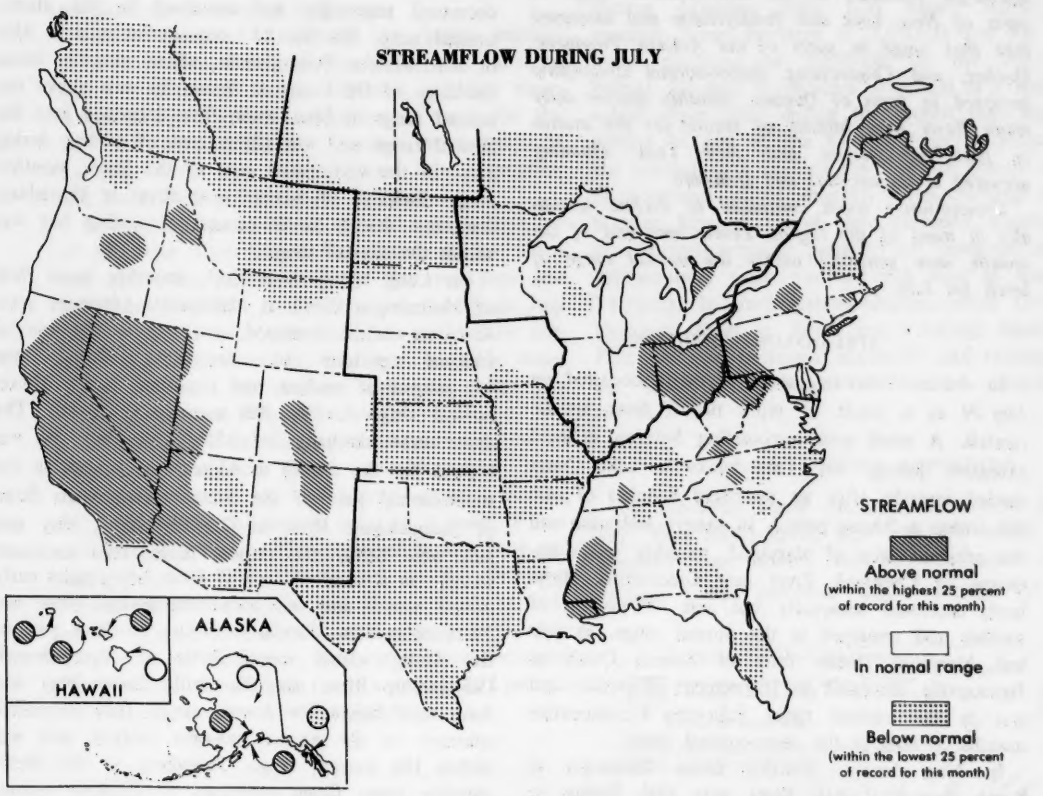
WATER RESOURCES REVIEW for JULY 1980

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH



STREAMFLOW AND GROUND-WATER CONDITIONS

Streamflow generally decreased seasonally in Alberta, British Columbia, central New England and southern States of the Northeast Region, and in most parts of the Midcontinent, West, and Western Great Lakes Regions. Elsewhere, flows were variable.

Monthly mean discharge remained in the above-normal range in a large area in and adjacent to Nevada, and in parts of Colorado, Indiana, Louisiana, Mississippi, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, Virginia, and West Virginia. Monthly and/or daily mean discharges were highest of record for the month in parts of Quebec, Alaska, New York, and Utah. Flooding occurred in Connecticut, Delaware, Michigan, and Mississippi.

Drought conditions prevailed in northern Minnesota, eastern Montana, and in much of the Midcontinent Region as a result of a record-breaking heat wave. Monthly mean flows remained in the below-normal range in large areas of southern Canada and in parts of Kansas, Kentucky, Illinois, Minnesota, Missouri, Montana, North Carolina, North Dakota, Tennessee, Texas, Washington, and Wyoming. Monthly mean flows were lowest of record for the month in parts of Minnesota.

Ground-water levels continued to decline seasonally in most of the Northeast Region, but levels were generally within the normal range. In the Southeast Region, trends were mixed in West Virginia and Florida, and generally declined seasonally in other States; levels were above and below average. In the Western Great Lakes Region, levels generally declined and were mostly below average in the northern States in the region; they were average or above average in the southern States. In the Midcontinent Region, levels mostly declined except for mixed trends in Texas; levels were mostly below average. In the West, levels generally declined and were mostly below average except in southern California and Nevada.

New high ground-water levels for July occurred in Kentucky and Nevada, and a new alltime high was reached in Utah. New low levels for July were recorded in Arizona, Arkansas, Idaho, Kansas, Louisiana, Mississippi, Montana, New Mexico, North Dakota, and Texas, and new alltime low levels were reached in Arizona, Georgia, Idaho, several in Louisiana, and in Utah.

NORTHEAST

[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

Streamflow decreased seasonally in Maryland, New Jersey, Pennsylvania, and central New England, and was variable elsewhere in the region. Monthly mean discharges remained in the above-normal range in parts of New York and Pennsylvania and increased into that range in parts of the Atlantic Provinces, Quebec, and Connecticut. Below-normal streamflow persisted in parts of Quebec. Monthly and/or daily mean flows were highest of record for the month in parts of Quebec and New York. Flooding occurred in Connecticut and Delaware.

Ground-water levels continued to decline seasonally in most of the region. Levels near end of the month were generally within the normal range of levels for July.

STREAMFLOW CONDITIONS

In central Delaware, severe flooding occurred on July 29 as a result of rapid runoff from intense rainfall. A small area surrounding Smyrna suffered extensive damage when the banks of Lake Como eroded severely after an unofficial 8 inches of rain fell within a 2-hour period. In eastern Delaware and the adjacent area of Maryland, monthly mean discharge of Choptank River near Greensboro, Maryland, decreased seasonally but was 159 percent of median and remained in the normal range. In central Maryland, mean flow of Seneca Creek at Dawsonville decreased to 160 percent of median and was in the normal range following 4 consecutive months of flow in the above-normal range.

In New Jersey, monthly mean discharges of South Branch Raritan River near High Bridge, in the northern part of the State, and Great Egg Harbor River at Folsom, in the southern part, decreased seasonally and were slightly less than median but remained within the normal range.

In southwestern Pennsylvania, mean flow of Monongahela River at Braddock continued to decrease seasonally but remained above the normal range for the 4th consecutive month and was 238 percent of median. In the northwestern part of the State, mean flow of Allegheny River at Natrona decreased seasonally and remained in the above-normal range for the 2d consecutive month. Also in northwestern Pennsylvania, where monthly mean discharge of Oil Creek at Rouesville was above the normal range in June, mean flow decreased into the normal range and was 129 percent of median during July. In the east-central part of the State, monthly mean discharge of Susquehanna River at Harrisburg decreased sharply to 68 percent of median but was within the normal range.

On Long Island, New York, monthly mean flow of Massapequa Creek at Massapequa (drainage area, 38 square miles) increased, contrary to the normal seasonal pattern of decreasing flows, was 176 percent of median, and remained in the above-normal range for the 4th consecutive month. The daily mean discharge of 155 cfs on July 29 was highest for the month in 43 years of record. In the south-central part of the State, where mean flows of Susquehanna River at Conklin during May and June were below the normal range, flow increased sharply as a result of runoff from heavy rains early in the month and was above the normal range and 1½ times median. Similarly, in the northern part of the State, where mean flows of West Branch Oswegatchie River near Harrisville during May and June were below the normal range, flow increased, contrary to the normal seasonal pattern, and was within the normal range. Elsewhere in the State, monthly mean flows continued to decrease seasonally and remained in the normal range at Hudson River at Hadley and Mohawk River at Cohoes.

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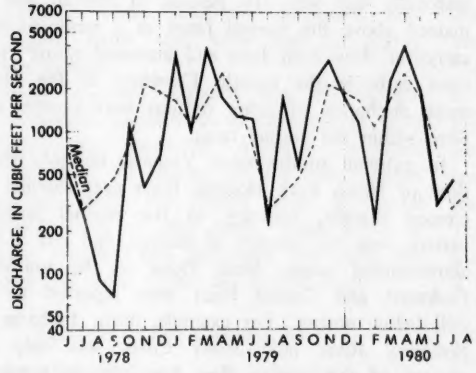
In southwestern Connecticut, moderate flooding occurred at monthend as a result of rapid runoff from intense rainfall. In the northeastern part of the State, mean flow of Mount Hope River near Warrenville increased, contrary to the normal seasonal pattern of decreasing flow, and was above the normal range. Elsewhere in the State, monthly mean discharges at index stations decreased seasonally and remained in the normal range.

Flows decreased seasonally at index stations throughout central New England and were generally within the normal range. However, monthly mean flows remained in the below-normal range for the 2d and 3d consecutive months, respectively, at Lamprey River near New Market, New Hampshire and Batten Kill at Arlington, Vermont.

In northern Maine, where monthly mean discharge of St. John River below Fish River, at Fort Kent was below the normal range in May and June and less than ½ median, flow increased sharply in July to 129 percent of median and was within the normal range. Elsewhere in the State, monthly mean flows continued to decrease seasonally, were less than median, and within the normal range.

In northern Nova Scotia, monthly mean flow of Northeast Margaree River at Margaree Valley increased, contrary to the normal seasonal pattern, and was above the normal range as a result of runoff from heavy rains that occurred in late June and early July. In the central part of the Province, where mean discharge of St. Mary's River at Stillwater was below the normal range and only 39 percent of median in June, mean flow increased sharply into the normal range and was 162 percent of the July median flow.(See graph.)



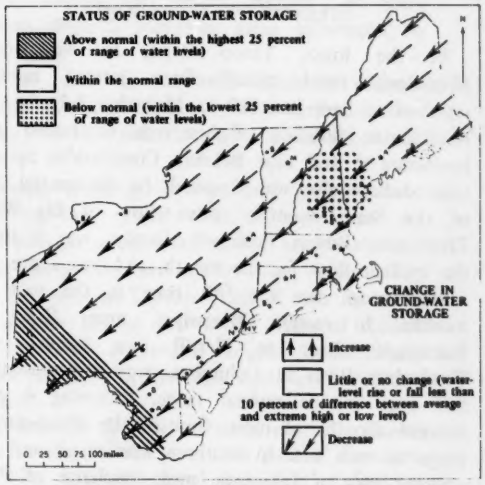
Monthly mean discharge of St. Mary's River at Stillwater, Nova Scotia (Drainage area, 523 sq mi; 1,355 sq km)

In New Brunswick, mean flows of Lepreau River at Lepreau and Upsalquitch River at Upsalquitch increased sharply to more than twice the median flows for July and were above the normal range for the first time since October and September of 1979 at the respective sites.

In eastern Quebec, south of the St. Lawrence River at the index station on Matane River near Matane (drainage area, 636 square miles), the monthly mean discharge of 2,840 cfs and the daily mean discharge of 9,890 cfs on the 7th were highest for July in 58 years of record as a result of runoff from rains during the month that was described as one of the wettest Julys on record. In the south-central part of the Province (north of the St. Lawrence River), monthly mean discharge of St. Maurice River at Grand Mere increased, contrary to the normal seasonal pattern, but remained in the below-normal range for the 6th time in the past 7 months. In southwestern Quebec, mean flows of Harricana River at Amos and Coulonge River near Fort Coulonge decreased seasonally and remained in the below-normal range for the 2d consecutive month.

GROUND-WATER CONDITIONS

Ground-water levels continued to decline seasonally. (See map.) Levels near end of month were generally near normal for July in most of the region. Levels remained below average (at least



Map shows ground-water storage near end of July and change in ground-water storage from end of June to end of July.

slightly) in northern New England. They were above average in western Maryland and southwestern Pennsylvania.

SOUTHEAST

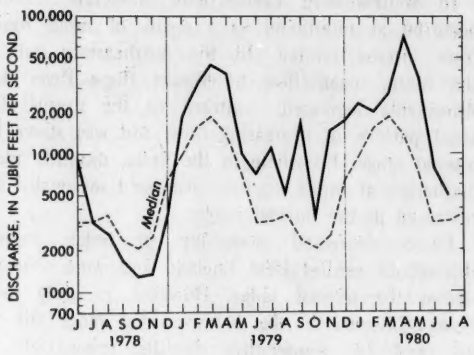
[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

Streamflow generally decreased in Alabama, Florida, Georgia, North Carolina, South Carolina, and Tennessee, but was variable in other States of the region. Monthly mean flows remained in the above-normal range in parts of Mississippi, North Carolina, Virginia, and West Virginia. Mean flows remained in the below-normal range in parts of Kentucky, North Carolina, and Tennessee, and decreased into that range in parts of Alabama, Florida, Georgia, and South Carolina. Flooding occurred in Mississippi.

Ground-water levels declined in Kentucky, Virginia, Mississippi, Alabama, and Georgia, and declined in most of North Carolina; trends were mixed in West Virginia and Florida. Levels were above average in Alabama, mostly above average in Kentucky, and above and below average elsewhere in the region. A new July high level occurred in Kentucky, and new July lows were reached in Mississippi. A new alltime low was recorded in Georgia.

STREAMFLOW CONDITIONS

In the lower Yazoo Delta, in west-central Mississippi, rapid runoff from intense rainfall, reported to have been 10 to 11 inches July 20–21, resulted in flooding of hundreds of homes and businesses in and near Belzoni. Considerable agricultural damage also was reported. In the central part of the State, monthly mean flow of Big Black River near Bovina increased sharply, was 3 times the median flow for the month, and was above the normal range for the 9th time in the past 11 months. In eastern Mississippi, mean flows of Pascagoula River at Merrill (see graph), and Tombigbee River at Columbus decreased seasonally and were in the normal range, following 4 consecutive months of mean flow in the above-normal range at each site. In southern Mississippi, and the adjacent area of Louisiana, mean discharge of Pearl River as measured near Bogalusa, Louisiana, increased contrary to the normal seasonal pattern, was 227 percent of median and remained above the normal range for the 19th consecutive month.



Monthly mean discharge of Pascagoula River at Merrill, Miss. (Drainage area, 6,600 sq mi; 17,100 sq km)

In western Tennessee, monthly mean flow of Buffalo River near Lobelville continued to decrease seasonally but remained above the normal range for the 14th time in the past 16 months. By contrast, in the east-central part of the State, mean flow of Emory River at Oakdale decreased sharply, was only 11 percent of median, and remained in the below-normal range. Elsewhere in the State, monthly mean discharges were in the normal range.

In southern Kentucky, mean flow of Green River at Munfordville also decreased sharply, was only 42 percent of median and was below the normal range. In the northern part of the State, monthly mean discharge of Licking River at Catawba increased, contrary to the normal seasonal pattern, and was in the normal range after 2 consecutive months of below-normal flow.

In extreme northern West Virginia, mean flow of Potomac River at Paw Paw continued to decrease seasonally but was 216 percent of median and remained above the normal range as a result of high carryover flow from June and increased runoff from rains early in the month. Elsewhere in the State, mean discharges of index stations were variable and were within the normal range.

In extreme southwestern Virginia, monthly mean flow of North Fork Holston River near Saltville increased sharply, contrary to the normal seasonal pattern, was 225 percent of median, and was in the above-normal range. Mean flows in the southeast Piedmont and Coastal Plain were reported to be well below normal. For example, mean discharge of Nottaway River near Stony Creek was only 68 percent of the median flow for July. In northern Virginia mean flow of Rapidan River near Culpeper decreased seasonally but was 98 percent of median and remained in the normal range.

In the west-central Piedmont of North Carolina, monthly mean flow of South Yadkin River near Mocksville continued to decrease seasonally, but remained above the normal range for the 9th time in the past 11 months. In central and eastern parts of the State, mean discharge of Deep River at Moncure and Contentnea River near Hookerton, respectively, decreased into the below-normal range and were about 1/3 the median flows for the 2 sites.

In northeastern South Carolina, mean discharge of Lynches River at Effingham decreased, contrary to the normal seasonal pattern, was only ½ the median flow for the month, and was in the below-normal range. In the central part of the State, monthly mean flow of North Fork Edisto River at Orangeburg also decreased but remained near median and within the normal range.

In Georgia, most streams were reported to have declined at a greater than normal rate since April. In northern and eastern parts of the State, mean flows of Etowah River at Canton and Altamaha River at Doctortown, respectively, decreased seasonally and were in the normal range. In western and southern parts of the State, monthly mean discharges of Flint River near Culloden and Alapaha River at Statenville, respectively, decreased into the below-normal range.

In west-central Florida, mean flow of Peace River at Arcadia decreased, contrary to the normal seasonal pattern, and was in the below-normal range for the first time since last July. In the east-central part of the State, monthly mean discharge of St. Johns River near Christmas also decreased contrary to the normal seasonal pattern, was only 19 percent of median, and was below the normal range. In northern Florida, mean flows also decreased, were in the normal range, and were near or slightly greater than median.

In extreme northern Alabama and the adjacent area of Tennessee, monthly mean discharge of Paint Rock River near Woodville, Alabama, decreased sharply, was only 37 percent of the July median flow, and was below the normal range. In central and southern parts of the State, mean flows at other index stations also decreased and were less than median but were within the normal range.

GROUND-WATER CONDITIONS

In West Virginia, levels rose in most of the northern and central counties, but declined elsewhere. Levels were above average nearly statewide except in a few southern and western counties.

In Kentucky, levels generally declined statewide; they were above average, however, in most parts of the State. Despite a slight rise in the level in the key well in the Louisville-Jefferson County area, a new high for July was recorded in 34 years of record.

Levels in Virginia declined in the three observation wells but were above average in the two northern wells. The level has been above average in the Tyler well in Louisa County for the past 18 months. For the first time in 21 months, the level was below average in the Matoaka Manor well at Colonial Heights south of Petersburg in the Piedmont.

In western Tennessee, the artesian level in the key well in the 500-foot sand near Memphis again declined more than ½ foot and continued below average by more than 14 feet.

In North Carolina, levels declined in the mountains, western Piedmont, and Coastal Plain, and rose in the eastern Piedmont. Levels were above average in the mountains and in the Piedmont but were below average in the Coastal Plain.

In Mississippi, levels generally declined statewide. Levels in wells in the Mississippi alluvial aquifer continued to decline moderately. Levels in wells in southern Mississippi declined slightly and, in the Jackson metropolitan area, declined about 2 feet. In northern Mississippi, levels continued to decline moderately except for greater declines—in some wells more than 5 feet—in areas influenced by heavy pumping.

Levels in wells in southwest Alabama declined but continued about average; in the central part of the State, levels declined but continued above average.

In Georgia, levels in the Piedmont declined about a foot. In the coastal counties, levels in the principal artesian aquifer declined 2 to 3 feet; near Savannah, levels declined more than 4 feet. The level in the well on Cockspur Island near Savannah reached a new alltime low in 24 years of record. The level in the water-table aquifer declined and was below average. In the southwest, levels declined 3 to 5 feet.

Levels declined in most areas in northern Florida but rose in the central peninsular part of the State during July. Levels declined less than a foot in Tallahassee and Jacksonville and rose less than a foot near Ocala, about 3 feet near Mulberry in west-central Polk County, and nearly 3½ feet north

of Tampa. End-of-month levels ranged from nearly 3 feet above average at Pensacola to 5 feet below average at Jacksonville. In southeastern coastal Florida, levels rose 0.7 feet in Palm Beach and St. Lucie Counties but were about the same as last month in Broward and Dade Counties; levels were average for the end of July.

WESTERN GREAT LAKES REGION

[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

Streamflow decreased seasonally in all parts of the region except in southeastern Ontario, where mean flow increased contrary to the normal seasonal pattern. Monthly mean flows remained in the above-normal range in parts of Indiana and Ohio. Mean discharges remained in the below-normal range in parts of Ontario, Illinois, and Minnesota, decreased into that range in parts of Wisconsin, and were lowest of record for July in parts of Minnesota. Flooding occurred in parts of Michigan.

Ground-water levels generally declined. Levels were at or above average in the southern States in the region, and in the north were mostly below average except locally in Minnesota.

STREAMFLOW CONDITIONS

In Minnesota, streamflow continued to decrease sharply as a result of below-normal rainfall and above-normal temperatures and was lowest of record for July in some parts of the State. For example, in northeastern Minnesota, the monthly mean discharge of 350 cfs in St. Louis River at Scanlon (drainage area, 3,430 square miles) was lowest for the month since records began in January 1908, and the mean flow of 110 cfs in Pigeon River at Middle Falls near Grand Portage (drainage area, 600 square miles) was 3d lowest for July since 1924. Similarly, in northwestern Minnesota, the monthly mean flow of 3,460 cfs in Rainy River at Manitou Rapids (drainage area, 19,400 square miles) was lowest for July in 52 years of record, and the monthly mean discharge of 1 cfs in Roseau River below State ditch 51, near Caribou (drainage area, 1,570 square miles) was the lowest for July since 1929. Also, the mean flow of 2.9 cfs in Rapid River near Baudette (drainage area, 543 square miles) was lowest for July since records began in 1956, and the monthly mean discharge of 6 cfs in Sand Hill River at Climax (drainage area, 426 square miles) was lowest for the month since records began in 1943. In central Minnesota, monthly mean flow of Crow River at Rockford decreased sharply to 53 percent of median but remained in the normal range. In the west-central part of the State, mean flow of Buffalo River near Dilworth decreased sharply, was only 17 percent of median, and remained below the normal range for the 3d consecutive month but was 6 times the minimum monthly mean of record for July. Cumulative runoff for the first 10 months of the 1980 water year at this site was only 53 percent of median. In the eastern part of the State, monthly mean discharge of Mississippi River at Anoka decreased to 41 percent of median and remained in the below-normal range for the 3d consecutive month but was about 3 times the minimum monthly mean discharge of record for July.

In western Ontario, monthly mean discharge of English River at Umfreville decreased seasonally, was only 25 percent of median, and remained below the normal range for the 4th consecutive month as a result of low carryover flow from June and below-normal runoff during July. In extreme southeastern Ontario, mean flow of Saugeen River near Port Elgin increased, contrary to the normal seasonal pattern, and was in the above-normal range as a result of increased runoff from rainfall near month-end.

In the adjacent area of Michigan's Lower Peninsula, monthly mean flows of Red Cedar River at East Lansing and Muskegon River at Evart decreased seasonally, remained in the normal range, and were 71 percent and 97 percent of the respective July median flows for those 2 stations. In the northern part of the Lower Peninsula, monthly mean levels of Crooked Lake near Conway, Houghton Lake near Houghton Lake Heights, and Lake Mitchell-Cadillac at Cadillac were, respectively, 0.09 foot, 0.24 foot, and 0.33 foot above median. In the Upper Peninsula, monthly mean discharge of Sturgeon River near Sidnaw decreased seasonally and remained in the normal range but was 1½ times the median discharge for the month. Monthly mean level of Lake Michigamme, also in the Upper Peninsula, was 0.5 foot below the 24-year median level. On the morning of July 7, a severe thunderstorm, with winds reported to have been greater than 100 miles per hour and rainfall in excess of 2 inches in 15 minutes, caused flooding and extensive damage in the southern part of Escanaba, in the south-central part of the Upper Peninsula. Also in the Upper Peninsula, the National Weather

(Continued on page 8.)

Provisional data: subject to revision

SELECTED DATA FOR THE GREAT LAKES, GREAT SALT LAKE, AND OTHER HYDROLOGIC SITES

GREAT LAKES LEVELS

Water levels are expressed as elevations in feet above International Great Lakes Datum 1955

(Data furnished by National Ocean Survey, NOAA, via U.S. Army Corps of Engineers office in Detroit. To convert data to elevations above mean sea level datum of 1929, add the following values: Superior, 0.96; Michigan-Huron, 1.20; St. Clair, 1.24; Erie 1.57; Ontario, 1.22.)

Lake	July 31, 1980	Monthly mean, July		July		
		1980	1979	Average 1900–75	Maximum (year)	Minimum (year)
Superior (Marquette, Mich.)	600.90	600.70	601.50	600.89	601.89 (1950)	598.99 (1926)
Michigan and Huron (Harbor Beach, Mich.)	579.74	579.76	579.94	578.68	581.04 (1974)	575.96 (1964)
St. Clair (St. Clair Shores, Mich.)	*575.35	575.25	575.19	573.84	576.20 (1973)	571.88 (1934)
Erie (Cleveland, Ohio)	572.42	572.43	572.17	570.92	573.34 (1973)	568.46 (1934)
Ontario (Oswego, N.Y.)	245.92	245.90	245.59	245.47	247.74 (1947)	242.75 (1934)

GREAT SALT LAKE

Alltime high: 4,211.6 (1873). Alltime low: 4,191.35 (October 1963).	July 31, 1980	July 31, 1979	Reference period 1904–79		
			July average, 1904–79	July maximum (year)	July minimum (year)
Elevation in feet above mean sea level:	4,199.90	4,198.70	4,198.50	4,204.40 (1923)	4,192.15 (1963)

LAKE CHAMPLAIN, AT ROUSES POINT, N.Y.

Alltime high (1827–1979): 102.1 (1869). Alltime low (1939–1979): 92.17 (1941).	July 29, 1980	July 31, 1979	Reference period 1939–78		
			July average, 1939–78	July max. daily (year)	July min. daily (year)
Elevation in feet above mean sea level:	94.95	95.37	95.73	99.34 (1973)	93.81 (1965)

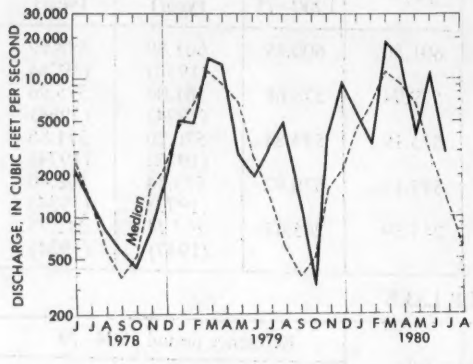
FLORIDA

Site	July 1980		June 1980	July 1979
	Discharge in cfs	Percent of normal	Discharge in cfs	Discharge in cfs
Silver Springs near Ocala (northern Florida)	820	108	770	750
Miami Canal at Miami (southeastern Florida)	104	42	0	223
Tamiami Canal outlets, 40-mile bend to Monroe	121	47	126	49

*Reading on July 28, 1980.

(Continued from page 6.)
Service reported an isolated thunderstorm at Kenton, which produced 5 inches of rain on the morning of July 14 and caused considerable flooding along highways near that village.

In northwestern Ohio, monthly mean flow of Maumee River at Waterville decreased seasonally, but was 216 percent of the median discharge for July and remained above the normal range as a result of high carryover flow from June and increased runoff from rain near monthend. (See graph.) Similarly, in



Monthly mean discharge of Maumee River at Waterville, Ohio (Drainage area, 6,330 sq mi; 16,395 sq km)

central and northeastern parts of the State, mean discharges of Scioto River near Higby and Little Beaver Creek near East Liverpool, respectively, decreased seasonally, remained in the above-normal range, and were 382 percent and 468 percent of the July median flows for those respective sites.

In northeastern Indiana, monthly mean discharge of Mississinewa River at Marion decreased seasonally but remained in the above-normal range, as a result of high carryover flow from June, and was 280 percent of median. In the southeastern part of the State, mean flow of East Fork White River at Shoals also decreased seasonally, was 1½ times the July median discharge, but remained in the normal range for the 6th consecutive month. Runoff from thunderstorms on the 21st alleviated drought conditions that were reported to be developing in streams in the northwestern part of the State. In western Indiana and the adjacent area of Illinois, flow of Wabash River as measured at Mt. Carmel, Illinois, decreased seasonally, was 124 percent of the July median discharge, and remained in the normal range.

In extreme southern Illinois, monthly mean flow of Skillet Fork at Wayne City decreased sharply, was only 8 percent of median and remained below the normal range for the 3d consecutive month, as a result of low carryover flow from June and below-normal precipitation during July. In the central part of the State, where mean discharge of Sangamon River at Monticello was in the above-normal range and was 219 percent of the median flow in June, monthly mean discharge decreased sharply into the below-normal range and was only 1/3 the July median discharge. In northern Illinois, mean flows of Rock River near Joslin and Pecatonica River at Freeport decreased seasonally, were 90 percent of the respective median flows, and remained in the normal range.

In eastern Wisconsin, monthly mean discharge of Fox River at Rapide Croche Dam near Wrightstown decreased from the above-normal range and 158 percent of median in June to the below-normal range and 66 percent of median in July. In the north-central part of the State, mean flow of Chippewa River at Chippewa Falls decreased sharply, was only 57 percent of median, and was below the normal range for the 2d time in the past 3 months. Elsewhere in the State, mean flows at other index stations also decreased seasonally and were less than median but were in the normal range.

GROUND-WATER CONDITIONS

Ground-water levels in shallow water-table wells in Minnesota declined and were below average. The level in the key well near Hanska, in Brown County in south-central Minnesota, was below average for the first time in 15 months. In the Minneapolis-St. Paul area, artesian levels continued to decline in wells tapping the Praire du Chien-Jordan and the deeper Mt. Simon-Hinckley aquifers in response to heavy pumping for air-conditioning but levels in both aquifers were above average.

Water levels in shallow wells declined generally in Wisconsin and were average or slightly below average. However, levels rose slightly in wells in the north-central part of the State. Levels in the artesian aquifer in northeastern and southwestern Wisconsin continued to decline.

In Michigan, levels generally declined and were below average.

In Illinois, the level in the shallow well in glacial drift at Princeton, in Bureau County, declined more than a foot, but was more than a foot above average.

Levels in Indiana declined, but by month's end had recovered to average levels.

In Ohio, levels declined seasonally, but continued above normal in the northeast and were about normal in the central part of the State.

MIDCONTINENT

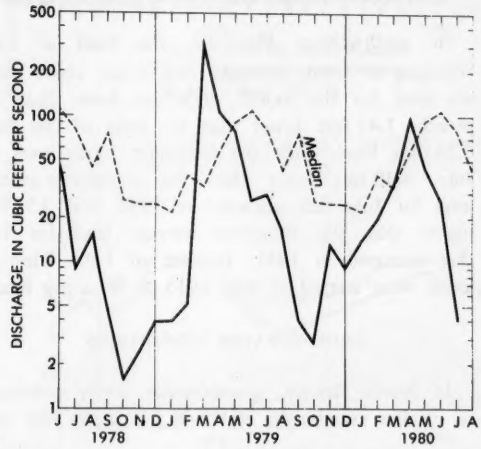
[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

Streamflow increased at some index stations in Saskatchewan, Louisiana, and South Dakota, but decreased at other index stations in the region. Monthly mean flows remained in the above-normal range in parts of Louisiana. Mean discharges remained in the below-normal range in parts of Kansas, Missouri, North Dakota, and Texas, and decreased into that range in parts of Arkansas, Louisiana, and Nebraska.

Ground-water levels generally declined, except for mixed trends among key wells in Texas. Levels were mostly below average. New low levels for July were observed in observation wells in North Dakota, Kansas, Arkansas, Louisiana, and Texas. Several all-time lows were reached in Louisiana.

STREAMFLOW CONDITIONS

In western Kansas, monthly mean flow of Saline River near R ssell (drainage area, 1,502 square miles) decreased sharply, remained in the below-normal range, and was only 5 percent of the median discharge for July. (See graph.) The daily mean discharge of 1.7 cfs on the 31st was only 0.4 cfs greater than the minimum daily mean flow observed during July in 29 years of record. In the southwestern and northeastern parts of the State, monthly mean discharges of Arkansas River at Arkansas City and Little Blue River near Barnes, respectively, also decreased sharply, were below the normal range, and were 22 and 23 percent of their respective median flows for the month.



Monthly mean discharge of Saline River near Russell, Kans. (Drainage area, 1,502 sq mi; 3,890 sq km)

In southwestern Oklahoma, monthly mean flow of Washita River near Durwood decreased sharply, was only 67 percent of median, but remained in the normal range. Reservoir storage in Oklahoma at monthend was reported to be near normal except in Hulah Lake near Hulah where it was 68 percent of normal.

In Texas, streamflow generally was below the normal range for the month except in the Guadalupe River basin in the south-central part of the State where mean flow was less than median but was within the normal range. Record-high temperatures and little or no rainfall during the month caused monthly mean flows to decrease sharply. Monthend records from 38 reservoirs in the State showed that storage decreased in 37 and increased in 1.

In northwestern Louisiana, monthly mean flow of Saline River near Lucky decreased sharply, was below the normal range, and was only 53 percent of median. By contrast, in the southeastern part of the State, mean discharge of Amite River near Denham Springs decreased seasonally but remained above the normal range and was 1½ times the median flow for the month. Mean discharges of Red River at Alexandria and Mississippi River at Baton Rouge were 61 percent and 92 percent of the respective medians for the month at those 2 sites.

In southern Arkansas, mean discharge of Saline River near Rye decreased seasonally but remained within the normal range. In the northern part of the State, monthly mean flow of Buffalo River near St. Joe also decreased sharply, was only 40 percent of median, and was below the normal range.

In the adjacent area of southern Missouri, mean discharge of Gasconade River at Jerome (drainage area, 2,840 square miles) continued to decrease seasonally and remained in the below-normal range as a result of low carryover flow from June. The monthly mean of 507 cfs was 50 percent greater than the minimum monthly mean discharge for July in 60 years of record. In northwestern Missouri, mean flow of Grand River near Gallatin decreased

into the below normal range and was only 14 percent of median but was about 6 times the minimum monthly mean for July in 59 years of record.

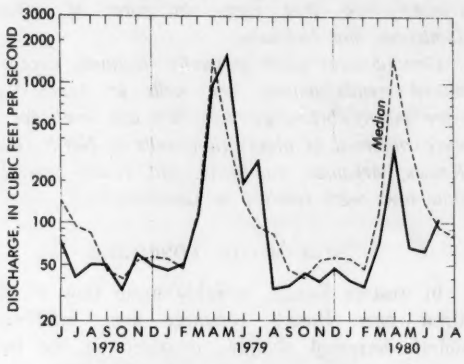
In north-central Iowa, where monthly mean flow of Des Moines River at Fort Dodge was twice the median discharge in June, mean flow during July was only ½ the monthly median but remained within the normal range. In the southwestern part of the State, monthly mean discharge of Nishnabotna River above Hamburg also decreased and was less than median but remained in the normal range. In eastern Iowa, mean discharge of Cedar River at Cedar Rapids decreased from the above-normal range in June into the normal range in July.

In northeastern Nebraska, monthly mean flow of Elkhorn River at Waterloo decreased sharply, was only 31 percent of median and was below the normal range, but was almost 2 times the lowest monthly mean discharge observed at this site during July in 60 years of record. Similarly, the lowest daily mean flow observed during July (163 cfs on the 29th) was 1½ times the lowest daily mean discharge observed during July in that period of record. By contrast, in the north-central part of the State, the lowest combined daily mean flow observed during July at the Loup River hydroelectric plant at Genoa (flow in river plus flow in canal) was the lowest daily mean discharge from the Loup River basin in 43 years of record. In northwestern Nebraska, monthly mean discharge of Niobrara River above Box Butte Reservoir decreased seasonally and was slightly less than median but remained in the normal range. In the Nebraska Panhandle, monthly mean flow in North Platte River was reported to be in the normal range. In southwestern Nebraska, mean flows of unregulated streams in the Republican River basin were reported to range from 40 to 70 percent of normal.

In central South Dakota, where mean flow of Bad River near Fort Pierre was below the normal range during the 4 months, March through June, monthly mean discharge increased as a result of runoff from rains early in the month and was in the normal range for the first time in the 1980 water year. In the eastern part of the State, mean flow of Big Sioux River at Akron decreased seasonally and remained in the normal range for the 5th consecutive month.

In southwestern North Dakota, monthly mean flow of Cannonball River at Brien decreased seasonally, was only 20 percent of median, and was in the below-normal range for the 3d time in the past 5 months. Cumulative runoff at this station for the first 10 months of the 1980 water year was only 33 percent of median. In eastern North Dakota, mean discharge of Red River of the North at Grand Forks continued to decrease seasonally, was 23 percent of median, and remained below the normal range for the 3d consecutive month.

In southeastern Saskatchewan, monthly mean flow of Qu'Appelle River near Lumsden increased, contrary to the normal seasonal pattern of decreasing flow, was greater than median for the first time since October 1979, and was in the normal range. (See graph.)



Monthly mean discharge of Qu'Appelle River near Lumsden, Saskatchewan (Drainage area, 6,780 sq mi; 17,600 sq km)

In southwestern Manitoba, the level of Lake Winnipeg at Gimli averaged 713.96 feet above mean sea level for the month, 0.06 foot lower than last month, 1.41 feet lower than the level of last July, 0.24 foot lower than the long-term mean level for July, 4.30 feet lower than the maximum average level for July that occurred in 1974, and 3.53 feet higher than the minimum average level for July that occurred in 1941. Records of Lake Winnipeg levels were started in May 1913 at Winnipeg Beach.

GROUND-WATER CONDITIONS

In North Dakota, ground-water levels continued to decline seasonally statewide. A new July low

level was reached in the key water table well in Stark County, in the western part of the State, in 12 years of record.

In Nebraska, levels declined statewide and were generally below long-term averages at month's end.

In Iowa, levels in shallow water-table wells declined statewide, but the levels in several key wells were above average.

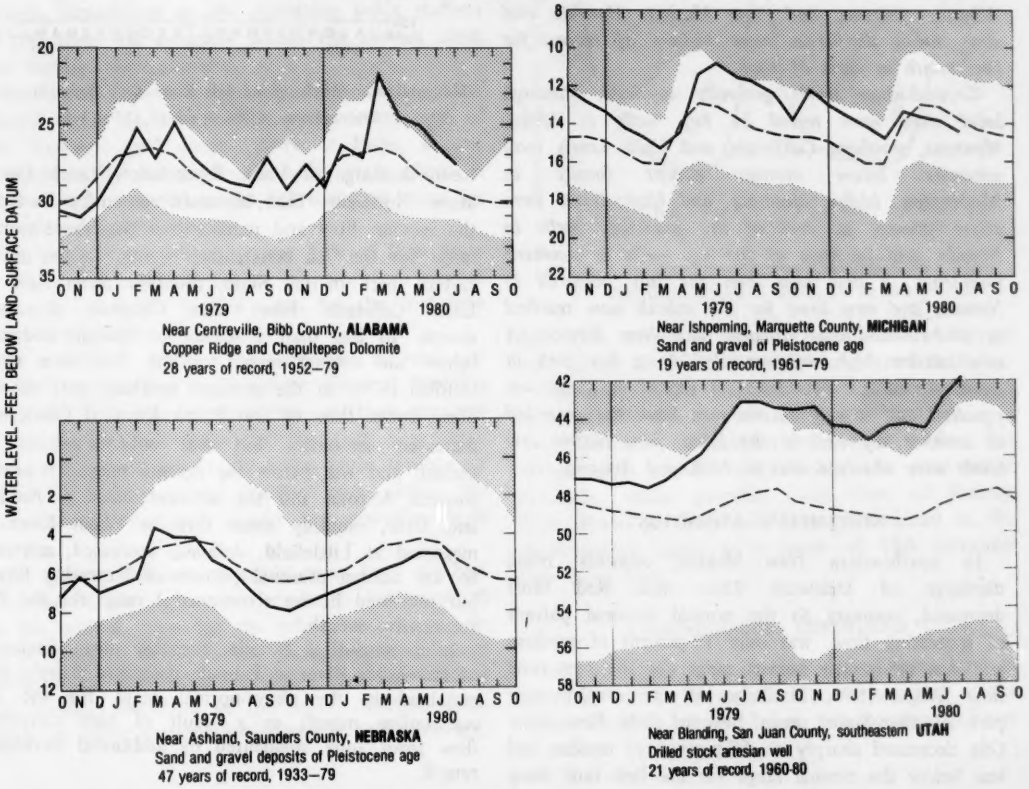
In Kansas, levels declined in the key wells, and were below average. The level in the key well at Colby, at the Kansas Agricultural Experiment Station, declined 2 feet, reaching a new low level for July in 33 years of record.

In Arkansas, in the rice-growing area in the east-central part of the State, the level in the key well in the shallow Quaternary aquifer rose slightly but continued below average by more than 4½ feet. The level in the well in the deep Sparta Sand aquifer declined nearly 56 feet in response to continuous pumping because of the drought conditions. In that part of the Sparta Sand aquifer that lies in central and southern Arkansas, the level in the key well at Pine Bluff declined 1½ feet and was 34½ feet below average.

In Louisiana, levels declined in 14 of 16 key observation wells. Levels in three wells in the Chicot aquifer in the rice-growing area in southwestern Louisiana were the lowest ever recorded. A record low for July was recorded in well JD-485, in the Chicot Sand, for the second successive month; records have been maintained in this well for 40 years. In the southeast, levels in wells in most aquifers declined seasonally. In the Baton Rouge area levels declined with increased pumping for industrial cooling. Levels in wells in the 2,800-foot sand changed little, however. Levels continued to decline in wells in the New Orleans area and in shallow aquifers of the Florida Parishes. There also were normal seasonal declines in wells in northern Louisiana.

MONTH-END GROUND-WATER LEVELS IN KEY WELLS

UNSHADED AREA INDICATES RANGE BETWEEN HIGHEST AND LOWEST RECORD FOR THE MONTH
DOTTED LINE INDICATES AVERAGE OF MONTHLY LEVELS, IN PREVIOUS YEARS
HEAVY LINE INDICATES LEVEL FOR CURRENT PERIOD



Near Centreville, Bibb County, **ALABAMA**
Copper Ridge and Chepultepec Dolomite
28 years of record, 1952–79

Near Ishpeming, Marquette County, **MICHIGAN**
Sand and gravel of Pleistocene age
19 years of record, 1961–79

Near Ashland, Saunders County, **NEBRASKA**
Sand and gravel deposits of Pleistocene age
47 years of record, 1933–79

Near Blanding, San Juan County, southeastern **UTAH**
Drilled stock artesian well
21 years of record, 1960-80

In Texas, in the artesian Edwards Limestone aquifer, the level in the key well at Austin rose and was above average, whereas the level in the well at San Antonio declined and was below average. The artesian level in the key well in the Evangeline aquifer at Houston declined and was below average. The level in the key water-table well in the bolson deposits at El Paso rose slightly, but was at a new July low in 15 years of record.

WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

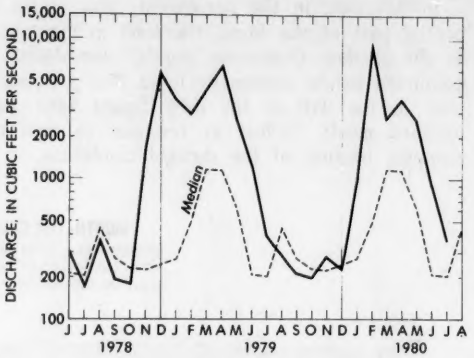
Streamflow decreased seasonally in all parts of the region except in Arizona and New Mexico where flows were variable. Monthly mean flows remained in the above-normal range in parts of Arizona, California, Colorado, Nevada, New Mexico, Oregon, and Utah, and increased into that range in parts of Idaho. Below-normal streamflow persisted in parts of British Columbia, Montana, Washington, and Wyoming, and decreased into that range in parts of Alberta, Arizona, and New Mexico. Monthly and daily mean discharges were highest of record for the month in parts of Utah.

Ground-water levels generally declined, although local rises were noted in key wells in Idaho, Montana, southern California, and Utah. Levels were generally below average except locally in Washington, Idaho, Montana, and Utah; levels were above average in two of the four key wells in Nevada, and in most of the key wells in southern California. A new high level for July occurred in Nevada, and new lows for the month were reached in Idaho, Montana, Arizona, and New Mexico. A new alltime high was recorded in a key well in Utah. An alltime low level on record in Idaho was equalled and a new alltime low level was recorded in another key well in the State. New alltime low levels were observed also in Utah and Arizona.

STREAMFLOW CONDITIONS

In southeastern New Mexico, monthly mean discharge of Delaware River near Red Bluff decreased, contrary to the normal seasonal pattern of increasing flow, was only 19 percent of median, and was below the normal range for the first time since August 1978. Similarly, in the southwestern part of the State, mean flow of Gila River near Gila decreased sharply to 80 percent of median and was below the normal range for the first time since October 1979. In the northern part of the State, monthly mean discharge of Pecos River near Pecos and Rio Grande below Taos Junction Bridge, near Taos, decreased seasonally but remained in the above-normal range for the 2d and 4th consecutive months at the respective sites.

In central Arizona, mean flow of Salt River near Roosevelt continued to decrease seasonally, was 181 percent of the July median flow, and remained in the above-normal range for the 6th consecutive month. (See graph.) Also in central Arizona, monthly



Monthly mean discharge of Salt River near Roosevelt, Ariz. (Drainage area, 4,306 sq mi; 11,153 sq km)

mean discharge of Verde River below Tangle Creek, above Horseshoe Dam, increased seasonally to twice the median flow and remained in the above-normal range for the 7th consecutive month. In the northeastern part of the State, monthly mean flow of Little Colorado River near Cameron decreased sharply to less than 1 percent of median and was below the normal range for the first time since October 1979. In the extreme southern part of the State, mean flow of San Pedro River at Charleston increased seasonally but was only 6 percent of median and was below the normal range. In northwestern Arizona and the adjacent areas of Nevada and Utah, monthly mean flow in Virgin River as measured at Littlefield, Arizona, decreased, contrary to the normal seasonal pattern of increasing flows, but remained in the above-normal range for the 7th consecutive month.

In north-central Nevada, monthly mean discharge of Humboldt River at Palisade decreased sharply but remained in the above-normal range for the 3d consecutive month as a result of high carryover flow from June augmented by additional snowmelt runoff.

In north-coastal California, mean flow of Smith River near Crescent City decreased seasonally to 100 percent of the July median flow and remained in the normal range. Elsewhere in the State, monthly mean flows at index stations remained far above normal, ranging from 175 percent of median for Sacramento River at Verona to 468 percent of median for Arroyo Seco near Pasadena. Combined contents of 10 reservoirs in northern and central California were 119 percent of average and 120 percent of the contents one year ago. All index reservoirs were storing contents above the July average except Folsom Lake, where storage was 5 percent below average.

In Oregon, flows decreased seasonally and were in the normal range and slightly below median except in the north-central part of the State, where monthly mean discharge in John Day River at Service Creek remained in the above-normal range and was 181 percent of median.

In northwestern Washington, monthly mean flow of Skykomish River near Gold Bar decreased sharply to 72 percent of median and remained in the below-normal range for the 2d consecutive month. Streamflow at the remaining index stations in the State was generally within the normal range and slightly above median.

In British Columbia, monthly mean discharges of Skeena River at Usk, in the northwestern part of the Province, and Fraser River at Hope, in the southern part, decreased seasonally, were about ¾ median, and remained in the below-normal range for the 2d consecutive month.

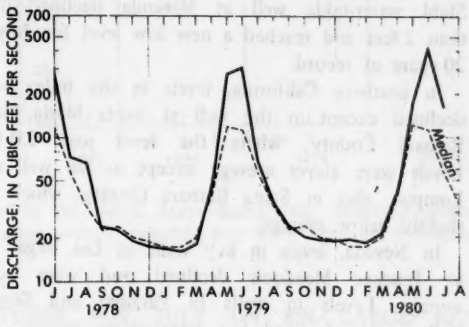
In southwestern Alberta, mean flow of Bow River at Banff decreased sharply to 67 percent of median and was below the normal range for the first time since March 1980.

In northern Idaho, the seasonal decrease of monthly mean flow in Clearwater River at Spalding was less than normal and flow at that site was above the normal range for the first time since May 1979. Elsewhere in the State, mean flows were near or slightly above median and within the normal range. Reservoir storage was generally above average.

In western Montana, monthly mean flow of Clark Fork at St. Regis decreased seasonally but remained in the normal range for the 4th consecutive month as a result of above-normal precipitation and cool temperatures that occurred during the first half of the month. Elsewhere in the State, monthly mean flows at index stations remained far below normal, ranging from 66 percent of median for Marias River near Shelby to 75 percent of median for Yellowstone River at Billings. Extreme drought conditions persisted in the eastern third of the State.

In northern Wyoming, mean flow of Tongue River near Dayton decreased seasonally, was below the normal range, and remained below median for the 17th consecutive month. In the southern part of the State, monthly mean discharge of North Platte River above Seminoe Reservoir, near Sinclair, was within the normal range and 139 percent of median.

In southwestern Utah, at the index station on Beaver River near Beaver (drainage area, 90.7 square miles), the monthly mean discharge of 159 cfs and the daily mean discharge of 354 cfs on the 1st were highest for July in 68 years of record and marked the second consecutive month of record high flows at that site. (See graph.) Elsewhere in the State, monthly mean flows at index stations were above median but within the normal range.



Monthly mean discharge of Beaver River near Beaver, Utah
(Drainage area, 90.7 sq mi; 235 sq km)

Contents of the Colorado River Storage Project decreased 421,460 acre-feet during the month.

In Colorado, streamflow was above median but within the normal range except in west-central Colorado, where monthly mean flow of Roaring Fork River at Glenwood Springs remained in the above-normal range as a result of high carryover flow from June.

GROUND-WATER CONDITIONS

In Washington, the artesian ground-water level in the key well in Tacoma, in the western part of the State, declined about 2 feet but continued above

average about 1¾ feet. The level in the well in Spokane Valley declined nearly 2¾ feet and was 5¼ feet below average.

In Idaho, the level in the sand and gravel water-table aquifer in the Boise Valley showed no net change by the end of July and was nearly 2 feet above average. The level in the key water-table well near Atomic City declined slightly and was 3 feet below average; the level equalled the alltime low set in 1979 in 30 years of record. The level in the key well near Rupert was at a new alltime low in 30 years of record, and the level in the well near Eden was at a new July low in 21 years of record. The well in the alluvial aquifer in northern Idaho, underlying the Rathdrum Prairie, rose ½ foot but continued 10 feet below average.

In Montana, the level in the water-table well at Hamilton Fairgrounds rose slightly but continued below average by ½ foot. However, the level in the Stahl water-table well at Missoula declined more than 2 feet and reached a new low level for July in 20 years of record.

In southern California, levels in the index wells declined except in the well at Santa Maria, Santa Barbara County, where the level rose 2.0 feet. Levels were above average except in the well near Lompoc, also in Santa Barbara County, which was slightly below average.

In Nevada, levels in key wells in Las Vegas and at Truckee Meadows declined and were below average. Levels in wells in Paradise and Steptoe Valleys also declined but were above average; that in the Steptoe Valley well, despite its decline, reached a new high for July in 30 years of record.

In Utah, levels declined except in the Blanding area, where the level in the key artesian well rose, setting a new alltime high in 20 years of record. The estimated level in the artesian observation well in the Holladay area indicates that the level near the end of July was at a new alltime low in 32 years of record.

Ground-water levels in Arizona declined in all five index wells during July; the level in the well in the Elfrida area, in valley fill, declined nearly a foot to a new alltime low in 29 years of record. The levels in two other index wells reached new July low levels.

In New Mexico, levels in the key wells continued their seasonal decline; the level in the Dayton water-table well in the southern part of the Roswell basin declined slightly and reached a new low level for July in 42 years of record.

ALASKA

Rapid melting of the record snowpack at higher elevations in south-coastal and south-central Alaska resulted in record-high discharges during the month. For example, the monthly mean flow of 10,580 cfs at the south-coastal index station, Kenai River at Cooper Landing (drainage area, 634 square miles), was highest for July since records began in 1948. Similarly, the daily mean discharge of 2,160 cfs on the 28th at Little Susitna River near Palmer (drainage area, 61.9 square miles) in south-central Alaska, was highest for the month since records began in 1948. The monthly mean discharge of 931 cfs at that station was 196 percent of the July median flow and was above the normal range. At the interior stations of Chena River at Fairbanks and Tanana River at Nenana, monthly mean flows increased, as a result of runoff from rains during the month, and were in the normal range, following 2 consecutive months of flows in the below-normal range. In southeastern Alaska, mean discharge of Gold Creek at Juneau decreased sharply, was only 2/3 the July median flow, and was below the normal range as a result of below-normal precipitation in that basin during July.

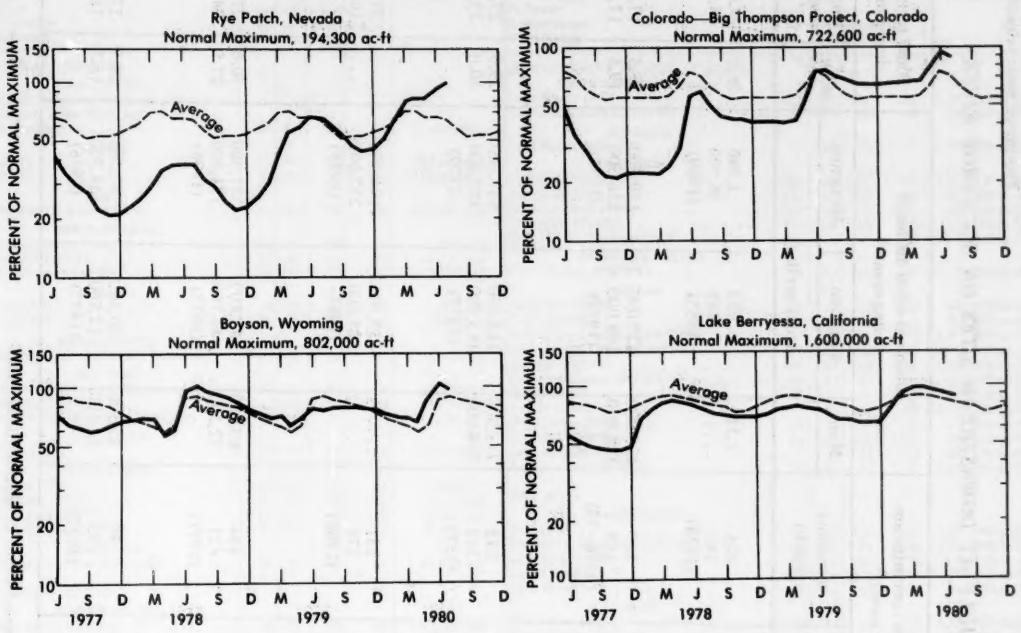
Ground-water levels in confined aquifers in the Anchorage area rose 2 to 3 feet. However, large supply wells rose or declined as much as 4 to 5 feet as a result of changes in pumping. An uncharacteristic rise in the shallow water table occurred as a result of rainy and cool weather. Ground-water levels in the Fairbanks area were average.

HAWAII

On the islands of Maui and Oahu, monthly mean flows of Honopou stream near Huelo and Kalihi stream near Honolulu, respectively, remained in the above-normal range for the 5th consecutive month and were 188 percent and 277 percent of the July median flows for those respective sites. Monthly mean flow of East Branch of North Fork Wailua River near Lihue, island of Kauai, was 2¼ times the July median discharge and was above the normal range.

On Guam, Mariana Islands, monthly mean flow of Ylig River near Yona increased seasonally and was greater than median but was in the normal range, following 2 consecutive months of flow in the above-normal range.

USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS, JUNE 1977 TO JULY 1980



Near- or above-average contents characterized many reservoirs in the United States during July. Monthend contents of several key reservoirs in the West, however, were much above average, including Rye Patch Reservoir in Nevada. (See graph above.)

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR JULY ON SIX LARGE RIVERS

The table on page 16 shows dissolved-solids and temperature data for July at six stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). NASQAN, as established by the U.S. Department of the Interior, Geological Survey, is designed to describe the water quality of the Nation's streams and rivers on a systematic and continuing basis, so as to meet many of the information needs of those involved in national or regional water-quality planning and management.

"Dissolved solids," as described in several columns of the table, are minerals dissolved in water and usually consist predominantly of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. These same minerals are among the most common components of the Earth's solid rocks and minerals, but gradually erode and at least partly dissolve as a part of natural weathering processes. Collectively these and other dissolved minerals constitute the dissolved-solids concentration expressed in milligrams per liter (mg/L) or the generally equivalent expression, parts per million (parts of dissolved matter in one million parts of water, by weight). Values of dissolved solids are convenient for comparing the quality of water from one time to another and from one place to another. Most drinking water contains between 50 and 500 mg/L of dissolved solids.

"Dissolved-solids discharge," expressed in tons per day, represents the total daily amount of dissolved minerals carried by the stream and is calculated by multiplying the dissolved-solids concentration (in mg/L) by the stream discharge (in cfs; times a unit conversion factor of .0027). Even though dissolved-solids *concentrations* are generally higher during periods of low streamflow than of high streamflow, the highest dissolved-solids *discharges* occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at times of low flow.

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR JULY AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	July data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean	Minimum	Maximum	Mean, in °C	Minimum, in °C	Maximum, in °C
						(tons per day)					
	NORTHEAST										
01463500	Delaware River at Trenton, N.J. (Morrisville, Pa.)	*1980	4,030	103	125	1,310	993	1,780	26.5	24.0	28.5
		1945–79	7,255	57	145	.....	465	16,700	.....	18.5	33.5
		(Extreme yr)	[c]5,066	(1947)	(1978)		(1965)	(1969)			
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, N.Y. median streamflow at Ogdensburg, N.Y.	1980	287,400	165	167	129,000	127,000	130,000	19.5	17.0	22.0
		1976–79	292,000	166	168	131,000	109,000	158,000	19.5	17.0	22.0
		(Extreme yr)	[c]256,600	(1976–77, 79)	(1978–79)		(1977)	(1976)			
	SOUTHEAST										
07289000	Mississippi River at Vicksburg, Miss.	1980	405,700	228	243	271,000	184,000	633,000	29.0	27.5	31.0
		1976–79	482,700	211	303	314,000	163,000	402,000	30.0	23.5	34.5
		(Extreme yr)	[c]456,600	(1977)	(1978)		(1977)	(1979)			
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam 53, near Grand Chain, Ill. (25 miles west of Paducah, Ky.; streamflow station at Metropolis, Ill.)	**1980	201,000	172	231	.....	53,500	184,000	.....	27.0	30.0
		1955–79	157,300	124	276	.....	25,000	237,000	.....	16.5	31.0
		(Extreme yr)	[c]130,200	(1965, 67)	(1968)		(1966)	(1958)			
	MIDCONTINENT										
06934500	Missouri River at Hermann, Mo. (60 miles west of St. Louis, Mo.)	1980	49,200	377	494	60,000	47,400	71,900	30.0	27.5	32.0
		1976–79	81,650	239	421	72,500	44,700	131,000	27.5	24.5	30.0
		(Extreme yr)	[c]79,360	(1977)	(1977)		(1977)	(1978)			
	WEST										
14128910	Columbia River at Warrendale, Oreg. (streamflow station at The Dalles, Oreg.)	1980	160,000	83	91	37,500	26,300	47,500	18.5	17.0	20.5
		1976–79	160,400	60	93	31,400	12,500	54,700	18.5	16.0	21.0
		(Extreme yr)	[c]275,900	(1976)	(1977)		(1977)	(1976)			

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1941–70, for comparison with data for current month.
*Dissolved solids and water temperatures are for 24 days only.
**Water temperatures are for 5 days only.
(CORRECTION: In table on page 16 of June 1980 issue, mean stream discharge during month, for Delaware River, should have read 9,526 cfs.)

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF JULY 1980

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of June 1980	End of July 1980	End of July 1979	Average for end of July	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	65	60	82	60	226,300 (a)
QUEBEC					
Allard (P)	88	95	80	75	280,600 ac-ft
Gouin (P)	72	72	72	66	6,954,000 ac-ft
MAINE					
Seven reservoir systems (MP)	66	66	78	79	178,500 mcf
NEW HAMPSHIRE					
First Connecticut Lake (P)	92	86	87	89	3,330 mcf
Lake Francis (FPR)	97	86	81	87	4,326 mcf
Lake Winnipesaukee (PR)	94	89	89	88	7,220 mcf
VERMONT					
Harriman (P)	79	77	81	78	5,060 mcf
Somerset (P)	80	75	81	82	2,500 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	84	79	85	83	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	93	82	81	82	34,270 mcf
Indian Lake (FMP)	97	98	97	90	4,500 mcf
New York City reservoir system (MW)	90	80	89	....	547,500 mg
NEW JERSEY					
Wanaque (M)	88	77	85	82	27,730 mg
PENNSYLVANIA					
Allegheny (FPR)	49	47	47	44	51,400 mcf
Pymatuning (FMR)	101	98	92	93	8,191 mcf
Raystown Lake (FR)	68	67	68	59	33,190 mcf
Lake Wallenpaupack (PR)	81	72	70	73	6,875 mcf
MARYLAND					
Baltimore municipal system (M)	99	97	98	91	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	99	91	95	90	12,580 mcf
Narrows (Badin Lake) (P)	95	94	95	97	5,616 mcf
High Rock Lake (P)	89	84	91	77	10,230 mcf
SOUTH CAROLINA					
Lake Murray (P)	96	86	90	78	70,300 mcf
Lakes Marion and Moultrie (P)	85	75	89	70	81,100 mcf
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	80	77	80	70	75,360 mcf
GEORGIA					
Burton (PR)	98	91	100	91	104,000 ac-ft
Sinclair (MPR)	95	93	91	91	214,000 ac-ft
Lake Sidney Lanier (FMPR)	66	62	67	62	1,686,000 ac-ft
ALABAMA					
Lake Martin (P)	98	92	99	90	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	61	51	73	57	1,156,000 cfsd
Douglas Lake (FPR)	77	53	90	60	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	91	79	90	77	510,300 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	68	62	88	63	1,452,000 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	89	74	95	78	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	67	67	86	84	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	72	62	80	74	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	26	24	40	38	1,640,000 ac-ft
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	88	84	93	97	22,700,000 ac-ft
SOUTH DAKOTA					
Angostura (I)	95	79	91	85	127,600 ac-ft
Bell Fourche (I)	50	18	62	55	185,200 ac-ft
Lake Francis Case (FIP)	77	74	79	82	4,834,000 ac-ft
Lake Oahe (FIP)	82	79	97	....	22,530,000 ac-ft
MIDCONTINENT REGION--Continued					
SOUTH DAKOTA--Continued					
Lake Sharpe (FIP)	102	101	101	100	1,725,000 ac-ft
Lewis and Clarke Lake (FIP)	82	84	90	94	477,000 ac-ft
NEBRASKA					
Lake McConaughy (IP)	92	80	73	74	1,948,000 ac-ft
OKLAHOMA					
Eufaula (FPR)	103	88	101	87	2,378,000 ac-ft
Keystone (FPR)	132	89	103	95	661,000 ac-ft
Tenkiller Ferry (FPR)	103	96	105	95	628,200 ac-ft
Lake Altus (FIMR)	94	68	88	63	133,000 ac-ft
Lake O'The Cherokees (FPR)	96	86	95	91	1,492,000 ac-ft
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	98	93	101	97	2,722,000 ac-ft
TEXAS					
Bridgeport (IMW)	26	22	51	50	386,400 ac-ft
Canyon (FMR)	92	89	96	71	385,600 ac-ft
International Amistad (FIMPW)	84	73	101	72	3,497,000 ac-ft
International Falcon (FIMPW)	63	63	100	68	2,668,000 ac-ft
Livingston (IMW)	96	89	100	82	1,788,000 ac-ft
Possum Kingdom (IMPRW)	96	87	95	99	570,200 ac-ft
Red Bluff (PI)	20	15	31	24	307,000 ac-ft
Toledo Bend (P)	97	93	94	88	4,472,000 ac-ft
Twin Buttes (FIM)	39	31	54	26	177,800 ac-ft
Lake Kemp (IMW)	62	52	58	90	268,000 ac-ft
Lake Meredith (FMW)	27	25	30	39	821,300 ac-ft
Lake Travis (FIMPRW)	88	80	94	77	1,144,000 ac-ft
THE WEST					
WASHINGTON					
Ross (PR)	98	99	100	95	1,052,000 ac-ft
Franklin D. Roosevelt Lake (IP)	103	102	91	100	5,022,000 ac-ft
Lake Chelan (PR)	95	100	100	98	676,100 ac-ft
Lake Cushman	103	100	103	99	359,500 ac-ft
Lake Merwin (P)	104	102	105	105	245,600 ac-ft
IDAHO					
Boise River (4 reservoirs) (FIP)	90	84	61	75	1,235,000 ac-ft
Coeur d'Alene Lake (P)	98	99	98	81	238,500 ac-ft
Pend Oreille Lake (FP)	98	99	98	95	1,561,000 ac-ft
IDAHO--WYOMING					
Upper Snake River (8 reservoirs) (MP)	93	76	65	71	4,401,000 ac-ft
WYOMING					
Boysen (FIP)	103	97	77	89	802,000 ac-ft
Buffalo Bill (IP)	105	97	85	101	421,300 ac-ft
Keyhole (F)	70	67	84	52	190,400 ac-ft
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	82	73	68	57	3,056,000 ac-ft
COLORADO					
John Martin (FIR)	49	2	2	18	364,400 ac-ft
Taylor Park (IR)	92	101	101	91	106,200 ac-ft
Colorado--Big Thompson project (I)	92	88	76	71	722,600 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	97	96	88	....	31,620,000 ac-ft
UTAH--IDAHO					
Bear Lake (IPR)	96	95	72	66	1,421,000 ac-ft
CALIFORNIA					
Folsom (FIP)	87	74	86	78	1,000,000 ac-ft
Hetch Hetchy (MP)	91	100	97	78	360,400 ac-ft
Isabella (FIR)	99	97	61	39	568,100 ac-ft
Pine Flat (FI)	92	96	70	54	1,001,000 ac-ft
Clair Engle Lake (Lewiston) (P)	96	105	81	83	2,438,000 ac-ft
Lake Almanor (P)	99	99	76	61	1,036,000 ac-ft
Lake Berryessa (FIMW)	92	88	71	81	1,600,000 ac-ft
Millerton Lake (FI)	96	103	67	64	503,200 ac-ft
Shasta Lake (FIPR)	91	82	81	79	4,377,000 ac-ft
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	66	70	31	70	744,600 ac-ft
NEVADA					
Rye Patch (I)	93	99	66	64	194,300 ac-ft
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	88	90	85	73	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	84	76	89	14	1,073,000 ac-ft
Salt and Verde River system (IMPR)	92	85	88	40	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	54	45	50	84	330,100 ac-ft
Elephant Butte and Caballo (FIPR)	57	53	36	27	2,453,000 ac-ft

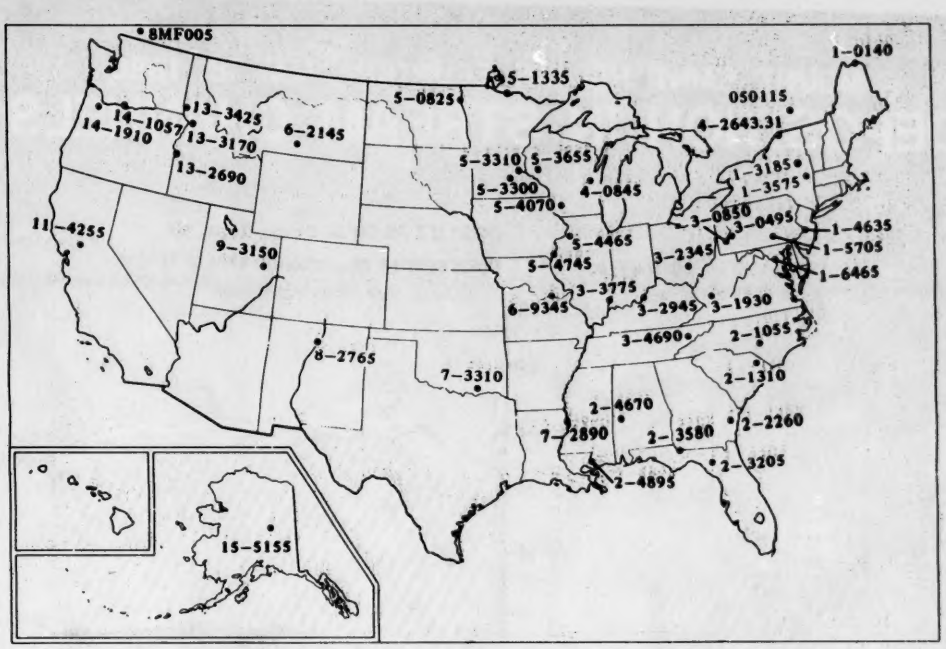
[a]Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

FLOW OF LARGE RIVERS DURING JULY 1980

Station number*	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1975 (cfs)	July 1980					
				Monthly discharge (cfs)	Percent of median monthly discharge, 1941–70	Change in discharge from previous month (percent)	Discharge near end of month		
							(cfs)	(mgd)	Date
1–0140	St. John River below Fish River at Fort Kent, Maine	5,690	9,549	6,013	129	+30	4,900	3,170	31
1–3185	Hudson River at Hadley, N.Y	1,664	2,853	938	83	-50	1,000	650	31
1–3575	Mohawk River at Cohoes, N.Y	3,456	5,630	1,925	104	-4	.....	.....	..
1–4635	Delaware River at Trenton, N.J	6,780	11,630	4,057	80	-17	4,250	2,750	24
1–5705	Susquehanna River at Harrisburg, Pa	24,100	34,200	7,860	68	-44	6,840	4,420	28
1–6465	Potomac River near Washington, D.C	11,560	[1] 11,190	4,840	110	-43	3,550	2,290	31
2–1055	Cape Fear River at William O. Huske Lock near Tarheel, N.C	4,810	5,007	2,170	99	-32	1,300	840	31
2–1310	Pee Dee River at Peedee, S.C	8,830	9,657	4,900	83	-11	3,800	2,460	28
2–2260	Altamaha River at Doctortown, Ga	13,600	13,780	6,640	93	-46	4,520	2,920	28
2–3205	Suwannee River at Branford, Fla	7,880	6,970	4,770	95	-28	8,340	5,390	31
2–3580	Apalachicola River at Chattahoochee, Fla	17,200	22,330	14,500	93	-13	12,600	8,140	31
2–4670	Tombigbee River at Demopolis lock and dam near Coatopa, Ala	15,400	22,570	4,900	83	-51	6,600	4,270	29
2–4895	Pearl River near Bogalusa, La	6,630	9,263	6,470	227	+1	5,420	3,500	31
3–0495	Allegheny River at Natrona, Pa	11,410	[1] 19,210	13,700	228	-21	19,100	12,300	25
3–0850	Monongahela River at Braddock, Pa	7,337	[1] 12,360	9,820	238	-47	13,500	8,730	25
3–1930	Kanawha River at Kanawha Falls, W.Va	8,367	12,530	6,550	135	-2	8,500	5,490	24
3–2345	Scioto River at Higby, Ohio	5,131	4,513	6,034	382	-24	2,760	1,780	28
3–2945	Ohio River at Louisville, Ky[2]	91,170	114,100	94,700	219	-11	75,700	48,900	27
3–3775	Wabash River at Mount Carmel, Ill	28,635	27,030	18,170	124	-52	15,000	9,690	31
3–4690	French Broad River below Douglas Dam, Tenn	4,543	[1] 6,794	4,370	107	-14	.....	.....	..
4–0845	Fox River at Rapide Croche Dam, near Wrightstown, Wis[2]	6,150	4,185	1,925	66	-68	.....	.....	..
02MC002 (4–2643.31)	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	241,100	287,500	112	1	288,000	186,000	31
050115	St. Maurice River at Grand Mere, Quebec	16,300	25,300	17,500	81	+35	17,200	11,100	31
5–0825	Red River of the North at Grand Forks, N. Dak	30,100	2,524	662	23	-54	500	320	31
5–1335	Rainy River at Manitou Rapids, Minn	19,400	12,950	3,460	19	-7	3,370	2,180	23
5–3300	Minnesota River near Jordan, Minn	16,200	3,412	2,190	57	-76	1,370	890	23
5–3310	Mississippi River at St. Paul, Minn	36,800	[1] 10,580	5,170	43	-75	4,300	2,780	24
5–3655	Chippewa River at Chippewa Falls, Wis	5,600	5,110	2,140	57	-53	.....	.....	..
5–4070	Wisconsin River at Muscoda, Wis	10,300	8,613	5,190	78	-61	3,000	1,940	31
5–4465	Rock River near Joslin, Ill	9,551	5,852	3,120	90	-56	2,900	1,860	31
5–4745	Mississippi River at Keokuk, Iowa	119,000	62,570	36,900	56	-62	34,000	22,000	31
6–2145	Yellowstone River at Billings, Mont	11,796	6,986	10,000	67	-53	5,400	3,490	31
6–9345	Missouri River at Hermann, Mo	524,200	79,750	49,190	62	-40	47,100	30,400	24
7–2890	Mississippi River at Vicksburg, Miss[4]	1,140,500	573,600	405,700	89	-31	327,000	211,000	28
7–3310	Washita River near Durwood, Okla	7,202	1,414	451	67	-88	120	78	31
8–2765	Rio Grande below Taos Junction Bridge, near Taos, N. Mex	9,730	724	943	284	-69	450	290	26
9–3150	Green River at Green River, Utah	40,600	6,366	7,712	120	-67	2,600	1,680	31
11–4255	Sacramento River at Verona, Calif	21,257	19,150	13,870	175	-6	15,000	9,690	28
13–2690	Snake River at Weiser, Idaho	69,200	18,170	10,540	97	-68	8,500	5,490	28
13–3170	Salmon River at White Bird, Idaho	13,550	11,290	14,420	111	-58	7,600	4,910	28
13–3425	Clearwater River at Spalding, Idaho	9,570	15,570	15,520	162	-55	4,960	3,210	28
14–1057	Columbia River at The Dalles, Oreg[5]	237,000	194,600	197,400	74	-52	.....	.....	..
14–1910	Willamette River at Salem, Oreg	7,280	23,810	5,330	84	-57	6,050	3,910	27–31
15–5155	Tanana River at Nenana, Alaska	25,600	23,850	56,970	98	+55	54,500	35,200	31
8MF005	Fraser River at Hope, British Columbia	83,800	96,400	141,600	77	-18	113,300	73,200	31

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.
*The U.S. station numbers as listed in this table are in a shortened form previously in use, and used here for simplicity of tabular and map presentation. The full, correct number contains 8 digits and no punctuation marks. For example, the correct form for station number 1–3185 is 01318500.

SELECTED STREAM-GAGING STATIONS ON LARGE RIVERS



Location of stream-gaging stations on large rivers listed in table on page 18.

WATER RESOURCES REVIEW

July 1980

Based on reports from the Canadian and U.S. field offices; completed August 14, 1980

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for July based on 20 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

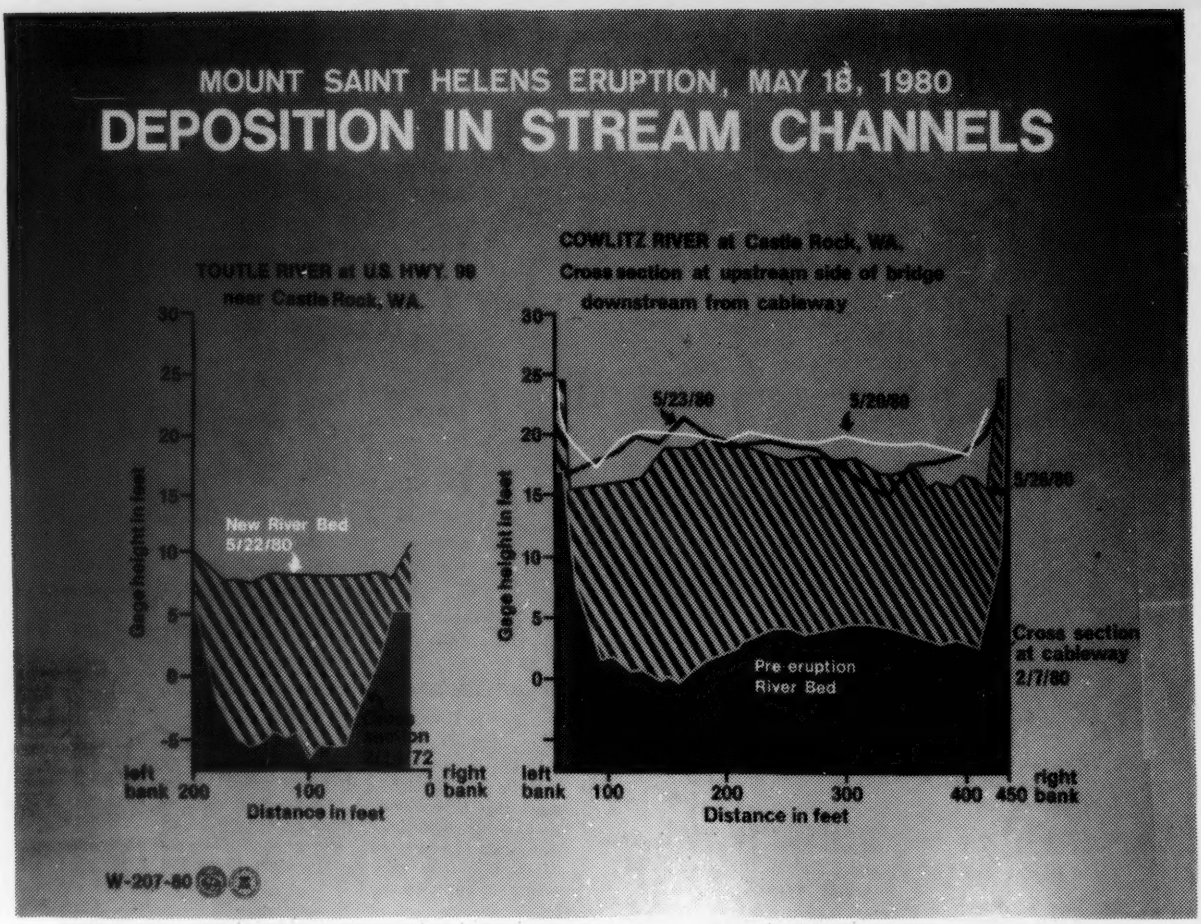
Streamflow for July 1980 is compared with flow for July in the 30-year reference period 1941–70. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for July is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range*. In the Water Resources Review the median is obtained by ranking the 30 flows of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median.

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the July flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of July. Water level in each key observation well is compared with average level for the end of July determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels*, unless described otherwise, are from the end of June to the end of July.

The Water Resources Review is published monthly. Special-purpose and summary issues are also published. Issues of the Review are free on application to the Water Resources Review, U.S. Geological Survey, Reston, Virginia 22092.



From U.S. Geological Survey Exhibits

Flooding of the Cowlitz River in the Castle Rock to Longview-Kelso reach probably is the greatest immediate hydrologic hazard from the Mount St. Helens eruptions. The May 18, 1980, eruption placed a 12- to 15-foot deep sediment deposit throughout this length of the reach. Bankfull, flow-carrying capacity of the channel has been reduced from about 76,000 cfs to less than 10,000 cfs.

Dredging and natural fluvial processes are changing the channel's carrying capacity and the flood situation is being monitored closely by the Tacoma WRD District and other Federal and State agencies. A computer model of the Cowlitz River that predicts the depth and areal extent of inundation by various flow rates needs continued adjustment to reflect the channel changes. The model is used to guide operations of upstream reservoirs. Several new streamflow and precipitation gages equipped with real-time data transmission systems have been installed on Cowlitz tributaries and other Mount St. Helens area streams to provide flash-flood warnings. Terminals to receive the flood-warning data have been established at the Cowlitz County Sheriff's office in Kelso, Washington; the National Weather Service River Forecast Center in Portland, Oregon; and the U.S. Forest Service Control Center in Vancouver, Washington.

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